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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/544,291	08/04/2005	Herbert Bruder	32860-000908/US	9190

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EXAMINER	
TANINGCO, ALEXANDER H	
ART UNIT	PAPER NUMBER
2882	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/544,291	BRUDER ET AL.	
	Examiner	Art Unit	
	Alexander H. Taningco	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2-4, 7, 8, 10-13, 16, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US 5,430,783) in view of Ning (US 6,477,221) and in further view of Besson et al. (US 6,459,754).

With regards to claims 1 and 16, Hu et al. disclose a method for generating images in computed tomography using 3D image reconstruction (Col. 2 Lines 9-11), the method comprising: scanning an examination object **42** by moving a focus on a spiral focal track about the examination object using a conical beam (Abs. Line 3) emanating from the focus and using a planar detector for detecting the beam (Col. 8 Line 22; Col. 12 Line 36), the detector supplying output data corresponding to the detected radiation (Col. 8 Lines 25-30); and reconstructing image voxels from the scanned examination object from the output data and reproducing attenuation coefficients of the respective voxel (Col. 13 Lines 15-16), each image voxel reconstructed that include a projection angular range of at least 180° (Col. 5 Line 60-61); whereby a measured value filtered for each image voxel is accumulated only on the respective voxel (Col. 5 Line 68), and an approximate weighting taking place for each voxel considered in order to normalize the

projection data used relating to the respective voxel (Col. 6 Line 1). Hu et al. fail to explicitly teach a method further comprising: each image voxel being reconstructed separately from projection data. Ning teaches a method comprising: all voxels and projections are independent of one another, and rays can be backprojected of each projection are independent (Col. 8 Lines 8-10). Besson et al. teach a method comprising: each image voxel being reconstructed separately from projection data (Col. 1 Lines 65-67; Col. 6 Line 64). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu et al. to include the features of Ning and Besson et al. to improve computational speed as taught by Ning (Col. 3 Lines 41-44).

With regards to claim 2, Hu et al. as modified above teach a method wherein reconstructing an image voxel, using all the detector data along a straight line that runs through the cone beam projection of the image voxel and is aligned in the direction of the projection of the spiral tangent (Fig. 5).

With regards to claim 3, Hu et al. as modified above teach a method wherein the image data of the detector image are subjected to a cosine weighting **88** for compensating oblique radiation (Col. 12 Equation 4).

With regards to claim 4, Hu et al. as modified above teach a method wherein data not directly available are obtained from the available data by interpolation from neighboring detector data (Col. 5 Lines 8-17).

With regards to claim 7, Hu et al. as modified above teach a method wherein a ramp filter that is manipulated with the aid of a smoothing window is applied to the normalized data (Col. 5 Line 56) in view of Ning.

With regards to claim 8, Hu et al. as modified above teach a method wherein a distance weighting is performed for the purpose of 3D back projection into the voxel considered (Col. 12 Equation 2).

Regarding claim 10, Hu et al. as modified above disclosed an apparatus comprising: a beam emanating from at least one focus **26** and a detector array **44** having a multiplicity of distributed detector elements for detecting the rays of the beam, the at least one focus being movable β relative to the examination object **42** on at least one focal track that runs around the examination object and a detector array situated opposite; means for collecting detector data **84**, filtering **89** and 3D back projection **90**; and means for processing the collected data **60** being fashioned in such a way to carry out the method as claimed in claim 1 (Fig. 1; Fig. 4).

Regarding claim 11, Hu et al. as modified above disclose a method computer program **60** product including program elements that during operation in a CT unit, execute the method as claimed in 1 (Fig.1; Fig. 4).

Regarding claim 12, Hu et al. as modified above disclose a method wherein the image data of the detector image are subjected to a cosine weighting **88** for compensating oblique radiation (Col. 12 Equation 4).

Regarding claim 13, Hu et al. as modified above disclose a method wherein data not directly available are obtained from the available data by interpolation from neighboring detector data (Col. 11 Lines 1-2).

Regarding claim 17, Hu et al. as modified above disclose a method wherein the projection angular range is a range from at least 180° to less than 360° (Col. 17 Line 24).

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US 5,430,783), Ning (US 6,477,221), and Besson et al. (US 6,459,754) in further view of Lai (US 6,118,841).

Regarding claims 5 and 14, Hu et al. as modified above disclose a method of the above claim. Hu as modified above fail to teach a method wherein during a weighting for compensating a data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when holding that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$). Lai teaches a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$) [Col. 7 Lines 9-10, 21-22]. Lai teaches a standard symmetric array (Abs.) and the angular span of the beam (Col. 7 Lines 9-10). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method wherein during the weighting for compensating the data redundancy, measuring beams (Sa, Sb) are regarded as redundant precisely when it

holds that: ($\theta a = (2k \cdot \pi + \theta b$ and $pa = pb$) or ($\theta a = (2k + 1) \cdot \pi + \theta b$ and $pa = - pb$), for accurate reconstruction (Col. 7 Line 3).

Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US 5,430,783), Ning (US 6,477,221), Besson et al. (US 6,459,754), and Lai (US 6,118,841) in further view of Silver et al. (US 2003/0123614).

With regards to claims 6 and 15, Hu et al. as modified above disclose a method as recited above in claim 5. Hue et al. as modified above fail to explicitly teach a method wherein the redundant data are multiplied by generalized Parker weights. Silver et al. teach a method wherein the redundant data are multiplied by generalized Parker weights [0017 Equations 1-5]. It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Lai to include the features of Silver et al to improve imaging and reduce artifacts as taught by Silver et al. [0017 Lines 1-2].

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hu et al. (US 5,430,783), Ning (US 6,477,221), and Besson et al. (US 6,459,754) in further view of Gullberg et al. (IEEE Vol. 11, no. 1, June 1992).

Regarding claim 9, Hu et al. as modified above disclose a method as recited in claim 1 above. Hu et al. as modified above fail to teach a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting measured data in accordance with the movement phases of an examined heart. Gullberg discloses a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting the measured data in

accordance with the movement phases of an examined heart (Pg.91 Para. 5). It would have been obvious to one of ordinary skill in the art, at the time of invention to modify the invention of Hu to include a method wherein the method is used for cardiac computer tomography by at least one of selecting, weighting and sorting the measured data in accordance with the movement phases of an examined heart, for better diagnosis of ischemic heart disease as taught by Gullberg (Pg. 91 Para. 1 and Pg. 99 Para. 5).

Response to Arguments

Applicant's arguments with respect to claims 1 and 16 have been considered but are moot in view of the new ground(s) of rejection.

New reference Besson et al. (US 6,483,892) disclose the required limitations noted above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show:

Kachelriess et al. (NPL)

- A weighting strategy that assigns individual data ranges to each voxel ensures 100% data usage and thus the maximum dose utilization possible
- Each image voxel being reconstructed separately

Zmora (US 5,708,691) (378/4)

- A voxel of a subject irradiated with x-rays is divided into a plurality of sub-voxels
- Projection data for the sub-voxels can be weighted before backprojection

Wang et al. (US 6,483,892) (378/43)

- Weight functions
- Parker weights

Heuscher et al. (US 2003/0007593) (378/4)

- Each voxel will remain within the x-ray cone beam range for at least a selected number of cardiac cycles

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander H. Taningco whose telephone number is (571) 272-8048. The examiner can normally be reached on Mon-Fri 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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